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ABSTRACT

This experiment examined the effects of headings and adjunct questions embedded in expository text on the delayed multiple-choice test performance of college students. Subjects in the headings-present group performed significantly better on the retention test than did the subjects in the headings-absent group. The main effect of adjunct questions was not significant, but there was a significant interaction of locus of control group and adjunct questions. For subjects with an internal locus of control, performance in the questions-present condition exceeded significantly performance in the questions-absent condition; however, adjunct questions did not significantly affect the performance of subjects with an external locus of control. The results support the view that headings may promote the organization of passage information so as to increase its general availability, and the results suggest possible differences in the organizational effects of adjunct questions in readers differing in locus of control. (Author/PN)

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The Relationship of Headings, Questions, and Locus of Control to Multiple-choice Test Performance

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Running head: HEADINGS, QUESTIONS AND LOCUS OF CONTROL

Abstract

This experiment examined the effects of headings and adjunct questions embedded in expository text on the delayed multiple-choice test performance of college students. Subjects in the headings-present group performed significantly better on the retention test than did the subjects in the headings-absent group, $p < .05$. The main effect of adjunct questions was not significant, but there was a significant interaction of locus of control group and adjunct questions, $p < .004$. For subjects with an internal locus of control, performance in the questions-present condition exceeded significantly performance in the questions-absent condition; however, adjunct questions did not significantly affect the performance of subjects with an external locus of control. The results support the view that headings may promote the organization of passage information so as to increase its general availability, and the results suggest possible differences in the organizational effects of adjunct questions in readers differing in locus of control.

The Relationship of Headings, Questions, and Locus of Control to Multiple-choice Test Performance

Recently, Nist and Hogrebe (1984, April) have argued that headings appear to be less likely to have an effect on multiple-choice test performance than on recall performance, and they stress the practical significance of this tendency in light of the widespread usage of multiple-choice tests in educational settings. In their own experiment, Nist and Hogrebe examined the influence of headings on memory for text material, as assessed by a multiple-choice test, employing a design that included the factors of text format (headings only, questions only, and both headings and questions), time of testing (immediate vs. delayed), and instructions in using text processing aids (present vs. absent). They reported no significant effect of text format on the multiple-choice test scores. However, Nist and Hogrebe failed to include in their design a control condition in which neither questions nor headings were presented. Thus, it is impossible to draw conclusions about the usefulness of headings and questions per se on the basis of their results. In addition, there is a methodological problem that may have contributed to the lack of significant text format effects. Nist and Hogrebe had their subjects read the passages and answer the adjunct questions outside of class, and thus it is impossible to know

whether the subjects processed the material as they were encouraged to do.

The issue of the possible interaction of headings and questions in influencing text memory is, nevertheless, an important one. As Nist and Hogrebe (1984, April) note in their paper, the beneficial effects of adjunct questions on memory for prose have been reported in a large number of studies (see, for example, review articles by Anderson & Biddle, 1975; Andre, 1979; Rickards, 1979). In particular, Anderson and Biddle (1975) report in their review that a number of studies have found that adjunct questions facilitate multiple-choice test performance, although the facilitative effect of the questions appears to be more reliable for recall retention tests. Furthermore, Rickards (1979) has argued on the basis of his review that the facilitative effect of the adjunct questions often extends to passage information not specifically quizzed by the questions, producing what is sometimes referred to as the indirect or incidental retention effect. In addition, despite Nist and Hogrebe's conclusion, Brooks, Dansereau, Spurlin, and Holley (1983, exp. 1) have found headings to enhance performance on multiple-choice retention tests when the test is taken after a delay. Thus, it is of interest to determine if combining headings and questions can produce higher levels of multiple-choice performance than

that found when neither or only one of the processing devices is employed. If, for example, the indirect facilitative effect of questions is more robust and encourages the same type of processing of text as headings, the inclusion of a heading for a segment of text that is also quizzed by an adjunct questions might produce no greater facilitation than that found when only the question is presented. On the other hand, if headings and questions complement each other in terms of their effects on the processing of the passage, having both a heading and a question for a passage segment should result in better multiple-choice test performance than that found when only the question is presented.

At present, it is not completely clear how questions or headings specifically affect passage processing in those situations in which they do promote passage retention. Recently, Wilhite (1982, 1985) has suggested that postpassage questions (i.e., questions appearing after the passage segment containing the answer) facilitate indirect retention by inducing a cognitive review of the passage that involves either a top-down search of the hierarchical memory representation of the passage or a spread of activation from the passage memory unit directly accessed by the adjunct question. In addition, Wilhite (1983, 1984) has argued that prepassage questions (i.e., questions appearing before the passage segment containing the answer) facilitate indirect

retention by encouraging the encoding of information related to the question and by serving as self-generated retrieval cues at the time of the retention test. With regard to the effects of headings, Brooks et al. (1983) have suggested that headings can act as advance organizers by activating schema relevant to the given topic, by encouraging the interrelating of concepts in the text, and by providing cues for subsequent retrieval. Thus, to the extent that these conceptualizations are correct, there would appear to be overlap in the type of processing induced by headings and adjunct questions. However, there are also reasons to believe that the processing induced by the two types of textual aids is not identical. For example, in Wilhite's (1982, 1983, 1984, 1985) research on adjunct questions, he employed verbatim questions that quizzed specific information in the passage, whereas most research on headings (see, for example, Hartley & Trueman, 1983) appears to have employed words or statements intended to indicate the main topic of the following material. Therefore, in situations in which the adjunct questions quiz specific passage information and the headings identify main topics, the organizational effects of headings should be more general than that of the questions. In fact, in such a situation, questions may be more important in encouraging elaborate processing of text material of possible relevance to the questions than they are in influencing the

general organization of the information in memory. If so, questions would be expected to have a greater facilitative effect on multiple-choice test performance than would headings in that the ability to discriminate between possible answer choices should benefit more from elaborate processing of text information during study than from a general organizing of the information. However, as Mandler (1972, 1977) has suggested, performance on a recognition memory test may be influenced by organizational factors in situations in which recognition depends on active retrieval processes. As delaying the recognition test appears to be one factor that contributes to the influence of organization on recognition (Mandler, 1972), it was predicted that headings would facilitate performance on a delayed multiple-choice retention test, but that the facilitative effect would not be as great as that produced by the inclusion of adjunct questions. In addition, if headings and questions are encouraging subtlely different aspects of text processing, then the effects of the two types of aids should be additive, and performance on the delayed multiple-choice test should be greater when both aids are available than when only one is employed.

The present study was designed to address these issues of the combined effects of headings and questions in such a way as to overcome the shortcomings of the Nist and Hogrebe (1984, April) experiment. The study was also intended to

address the issue of the ecological validity of adjunct question research as raised recently by Duchastel and Nungester (1984). These authors note that most research on the effects of postpassage adjunct questions have employed procedures that prevent lookbacks by subjects as they process the material. As a result, Duchastel and Nungester contend, the results of these studies may not accurately reflect the indirect retention effect of such questions when they are encountered by students in real-life learning situations in which looking back in the text for the answer to the question is likely to be encouraged. In their own study, Duchastel and Nungester (1984) encouraged lookbacks and failed to find an indirect facilitative effect of adjunct questions on the multiple-choice retention test. However, another aspect of ecological validity, the commitment of the subject to the experimental task, was not addressed in the Duchastel and Nungester study. The questions may have failed to affect memory for the material not directly quizzed by the questions because of subjects' perceptions that performance on the assigned task was of no personal significance. Thus, in the experiment to be reported, subjects were encouraged to look back in the text for answers to the adjunct questions, as a means of preparing for the delayed retention test, following instructions intended to produce high levels of commitment to the task. At the beginning of the experimental session,

subjects were told that their level of performance on the delayed retention test would determine whether they earned bonus points to be added to their psychology course grade for their participation in the experiment. In a further attempt to make the results of the present study more applicable to real-life learning situations by avoiding short, contrived prose passages (see Rothkopf, 1972), a chapter from a college history textbook was used as the to-be-learned material.

Also included in the experiment to be reported was the factor of hierarchical importance of the passage information being tested. In previous studies, Wilhite (1982, 1985) found that postpassage adjunct questions facilitated indirect recall of high-level information but had no effect on indirect recall of low-level information. However, it is possible that this failure to find indirect facilitation for low-level information was due to the fact that lookbacks were not allowed in these previous studies. In the absence of lookbacks, the memory-facilitating review process induced by the questions may be limited to the most readily accessible of the passage information, i.e., the high-level, superordinate information. On the other hand, if looking back in the text in order to answer questions results in a review of both high-level and low-level information, then indirect facilitation should be found in the current experiment for both types of passage information.

Furthermore, it was of interest to determine if any beneficical effect of headings would apply to both high-level and low-level information.

The present study was also designed to provide information about the possible relationship between the learner's locus of control and the effects of headings and questions on text processing. For example, Lefcourt (1982, chap. 5) has argued that individuals with an internal locus of control are in general likely to be superior to individuals with an external locus of control at assimilating new information but only when the new information is relevant to the primary task goal. Consequently, it was predicted that internals would outperform externals in answering multiple-choice questions about passage segments for which they received adjunct questions. In addition, it was of interest to determine if the adjunct questions would be less likely to produce indirect facilitation for readers with an external locus of control than for readers with an internal locus of control. This possibility is suggested by Lefcourt's (1982, chap. 5) argument that externals tend to be less likely to try discriminate between potentially relevant and potentially irrelevant information in a learning situation. Thus, internals may be more likely than externals to process differentially quizzed and unquizzed passage segments by expending greater processing effort on the

sections of the passage quizzed by an adjunct question. Also, to the extent that headings highlight passage information of relevance to performance on the retention test, headings might be expected to affect the performance of internals more than that of externals.

In summary, this experiment was designed to address the following questions:

1) Will headings facilitate delayed multiple-choice test performance in a situation in which they are used in conjunction with adjunct questions, or will the perhaps more robust indirect facilitative effect of the questions overwhelm any beneficial effect of the headings?

2) Will adjunct questions have an indirect facilitative effect on retention in a situation in which lookbacks in answering the questions are encouraged and subjects are highly motivated to perform well on the retention test?

3) Will adjunct questions and headings have an indirect facilitative effect on low-level as well as high-level passage information?

4) Will headings and adjunct questions influence differently the multiple-choice test performance of subjects with an internal locus of control and subjects with an external locus of control?

Method

Subjects and Setting

Sixty-four students enrolled in psychology courses at Widener University participated as subjects for course credit. All testing took place in regular university classrooms during morning and afternoon hours.

Materials

The passage used was that employed by Nist and Hogrebe (1984, April), a 2,136-word chapter, entitled "Anglo-America: Early Differences, Experiences, and Technologic Changes", from the American government textbook, Government by the People (Burns, Peltason, & Cronin, 1980). The chapter was divided into 10 sections in the actual text by the inclusion of embedded headings which consisted of a word or short phrase describing the main topic of the following material. For the headings-present group, the passage was presented in booklet format with the headings appearing as they did in the actual text. For the headings-absent group, the passage appeared in the booklet exactly as it did for the headings-present group except that the headings were removed. For nine of the 10 passage segments, a text-based adjunct question quizzing one of the main ideas in the section was constructed, and each subject saw five of these adjunct questions, each presented in the booklet immediately following the passage segment containing the answer to the

question. No adjunct question was generated for the first segment of the passage, consisting of the first two paragraphs following the title, because no heading, apart from the title itself, preceded this section in the actual text and because the information in this section was very general. The following is one of the passage segments with its associated heading and adjunct question:

New England

A strong sense of commerce was established early in New England. Agricultural efforts were necessary to sustain the populace, but there was no special crop that could provide great wealth or form the basis for trade as tobacco did in the southern colonies. Instead, wealth was accumulated by fishing, trade, and forestry. The white pine forest provided useful lumber for ship building and trade. The codfish on the offshore banks were another resource that could be traded. These resources, plus the wealth generated by their exchange, became a source of capital and established commercialism early in the northeast. By the late eighteenth century, capital was available for incipient industrial growth, and non-agricultural pursuits were already a tradition. Water-power potential in mechanical form (waterwheel) was substantial, and the ocean-shipping capacity for movement of raw materials and manufactured goods

existed. Shortly after independence, New England's incipient industry emerged as a competitor with Europe. Along with this development came the idea of tariff protection in some form for domestic industry.

What were the three major sources of money-making in New England?

Within both the headings-present group and the headings-absent group, two different versions of the passage were employed. Of the 10 sections of the passage, sections 1 and 8 were not involved in generating the two versions of the passage. As noted above, no adjunct question was generated for the first section of the passage, and thus it was not followed by a question in either version of the passage. In order to have an equal number of passage sections that were and were not followed by a question, section 8 of the passage (concerning the Middle Colonies) was selected at random to be followed by its associated adjunct question in both versions of the passage. One version of the passage then was generated by selecting randomly four of the remaining eight experimental sections of the passage as those also to be followed by questions in the experimental booklet. The other version of the passage contained questions

following the other four of the eight experimental sections of the passage.[1]

A multiple-choice retention test containing 18 questions was constructed. For each of the major sections of the passage except the first, two explicit text-based questions were generated. One of the questions quizzed a main idea from the passage segment, and the other quizzed detail information from that section of the passage. For example, for the passage section presented above, the main idea question read:

> Shipbuilding became an important trade in the New England colonies because:
>
> a. lumber was readily available.
> b. many ports were built for trade.
> c. many people earned a living through fishing.
> d. all of the above.

and the detail question read:

> Which of the following contributed to industrial growth in New England?
>
> a. geographic isolation
> b. water-power potential
> c. lack of capital
> d. severe winter weather.

The distinction between main-idea and detail information was made intuitively by the experimenter, but the judgements of

the experimenter were confirmed by three members of the faculty of the social science division who were naive to the purposes of the research. Each of the faculty members read each segment of the passage and then judged which of the two retention-test questions generated for that segment quizzed main idea information and which quizzed detail information. The judgements of two of the faculty members were consistent with those of the experimenter for all nine segments considered, and the judgements of the third faculty member were consistent with those of the experimenter for eight of the nine segments considered.[2]

None of the adjunct questions embedded in the passage were repeated in the multiple-choice retention test. The 18 questions appeared on three separate pages of the test booklet with the pages appearing in all six possible orders in different booklets.

Procedure and Design

The subjects participated in two sessions one week apart in groups ranging in size from two to 15. In the first session, subjects read the passage after receiving instructions to study the passage in preparation for a multiple-choice exam to be given during the second experimental session. They were told to be sure to write an answer for each question found in the text as a means of preparing for the later test. An inspection of the

experimental booklets revealed that all subjects complied with this instruction. The instructions encouraged lookbacks in answering the questions. To insure commitment to the task and to increase the ecological validity of the procedure, subjects were told that their performance on the multiple-choice exam would determine the amount of extra credit to be applied to their course grade as a result of their participation in the experiment. Subjects were told that they could read and study the passage at their own speed, that they could mark or underline the passage as they liked, and that they were free to re-read the passage, but they were asked not to spend more than an hour in reading and studying the passage. They were told to return their booklets to the experimenter once they felt they were adequately prepared for the test to be given on the passage next week. In the second experimental session, subjects completed one-half of the Wide Range Vocabulary Test (French, Ekstrom, & Price, 1963) and the Adult Nowicki-Strickland Internal-External Control Scale (Nowicki & Duke, 1974) before receiving the multiple-choice test on the passage. The vocabulary test was timed, but the subjects were free to complete the other two measures at their own speed. No subject took more than 30 minutes to complete the second session of the experiment. Approximately two weeks after the

completion of the experiment, subjects were debriefed during their regular psychology class meeting.

A split-plot design was employed with two between-subject factors, two within-subject factors, and one covariate. One of the between-subject factors was that of locus of control. Those subjects scoring below the median score of 8, out of a total possible of 32, constituted the group of internals, and those subjects scoring above the median constituted the group of externals. The other between-subject factor was that of headings. Subjects were randomly assigned to either the headings-present or the headings-absent group. Thus, there were 32 subjects in the headings-present group, 18 internals and 14 externals, and there were 32 subjects in the headings-absent group, 14 internals and 18 externals. One of the within-subject factors was that of questions. The questions-present condition referred to those four experimental passage sections followed by an adjunct question, and the questions-absent condition referred to those four experimental passage sections not followed by an adjunct question. Note that the two retention-test questions quizzing information from Section 8 of the passage were not included in the analysis. The other within-subject factor was that of type of retention-test question (main idea questions and detail questions). Thus, the dependent measure

was the number of multiple-choice retention-test questions of each type (main-idea and detail) answered correctly for those four experimental passage sections followed by an adjunct question (the questions-present condition) and for those four experimental passage sections not followed by an adjunct question (the questions-absent condition). The covariate in the analysis was the score on the measure of vocabulary knowledge, with each subject's score determined by subtracting one-fifth of the number answered incorrectly from the total number answered correctly.

Results

The internal consistency of the multiple-choice retention test was assessed by the calculation of an alpha coefficient. The obtained coefficient of internal consistency was .60.

In the analysis of covariance, the assumption of homogeneity of within-group regression coefficients was found to be tenable, as the test for the violation of homogeneity of regression was not significant, $F(3, 56) = 1.10$, $p < .36$.

The analysis of covariance did reveal a significant main effect of the between-subject factor of headings, $F(1, 59) = 4.51$, $p < .04$. Subjects in the headings-present group performed significantly better than subjects in the headings-absent group, with means of 2.62 and 2.34, respectively. The other between-subject factor of locus of

control was not significant, $F(1, 59) < 1$, nor was the two-way interaction of headings and locus of control, $F(1, 59) < 1$.

The within-subject factor of questions failed to reach significance, $F(1, 60) = 2.69$, $p < .11$, but the interaction of questions and locus of control was significant, $F(1, 60) = 9.44$, $p < .004$. The means from this interaction are shown in Table 1. Tests of simple main effects showed the effect of questions to be significant for subjects with an internal locus of control, $F(1, 60) = 10.97$, $p < .01$, but not for subjects with an external locus of control, $F(1, 60) = 1.40$, $p > .25$. Internals answered correctly significantly more retention test questions from passage segments that were quizzed by an adjunct question than they did from passage segments that were not quizzed by an adjunct question, whereas externals showed no significant difference in the number of questions answered correctly from quizzed and unquizzed passage segments. Tests of simple main effects also revealed that externals scored significantly higher than internals in the questions-absent condition, $F(1, 60) = 5.55$, $p < .05$, whereas internals scored higher than externals in the questions-present condition, although not significantly so, $F(1, 60) = 2.59$, $p < .25$. None of the other interactions involving the factor of questions was significant, all with $F < 1$.

Insert Table 1 about here.

The analysis also revealed a significant main effect of type of retention test question, $F(1, 60) = 121.24$, $p < .001$. Main-idea retention test questions were answered significantly better than detail retention test questions, with means of 3.05 and 1.91, respectively. None of the interactions involving the factor of type of retention test question were significant, all with $F < 1$.

Discussion

The results of this experiment demonstrate that headings can facilitate multiple-choice test performance in a situation in which a realistic prose passage is used and subjects are given instructions designed to produce a high level of commitment to the task. There was no evidence that the facilitative effect of headings was less robust than that of adjunct questions. On the contrary, the overall effect of headings was significant and did not interact with any of the other factors in the experiment, whereas the overall effect of adjunct questions was not significant. The interaction of adjunct questions and locus of control revealed that the presence of adjunct questions only significantly improved the retention test performance of subjects with an internal locus of control. The results suggest that headings may promote

recognition memory performance in a delayed test situation by encouraging effective organization of the passage material in such a way as to produce a general enhancement in the availability of the passage information at the time of test. On the other hand, adjunct questions of the type used in this experiment may, in subjects with an external locus of control, produce a more specific processing effect in which only the passage information quizzed by the question is elaboratively analyzed.

Thus, the findings of this experiment, along with those of the Brooks et al. (1983, exp. 1) study showing a significant positive effect of headings on multiple-choice test performance, complement those of researchers such as Hartley and Trueman (1983) and Holley, Dansereau, Evans, Collins, Brooks, and Larson (1981), who have reported facilitative effects of headings on various types of recall performance. Such evidence of the general facilitative effect of headings has educational and instructional implications. Even though the size of the significant headings effect in this experiment was small, the consistent use of headings by authors of instructional materials would appear to be indicated, given the small amount of effort involved in the generation of headings of the type employed in this study. In addition, the fact that the facilitative effect of headings was found in this experiment in the

absence of any instructions in the use of headings suggest that headings may encourage a type of passive organizational process that can promote retention in many readers in the absence of training. However, the importance of alerting readers to the presence of headings in text with regard to promoting retention is an unresolved issue. Brooks et al. (1983, exp. 2) have suggested that their failure to find a facilitative effect of headings in a follow-up study may have been due to the subjects not having been as sensitized to the presence of the headings in the second experiment. Although subjects in the headings-present group in the experiment reported here were not alerted to the presence of the headings, the presence of the adjunct questions may have helped call the subjects' attention to the headings. Additional studies are currently being planned that will address this issue of sensitization. Nevertheless, confidence in the ecological validity of the finding in this experiment of a beneficial effect of headings is increased by the fact that subjects performed the task in a situation in which they believed that their performance would determine the number of bonus points earned and in a situation in which they read, with lookbacks and re-reading allowed, a long prose passage written for actual college instructional purposes. In future research, it will be of interest to try to determine to what extent the reader's motivation mediates

the beneficial effect of headings in such situations. It will also be important in future research to try to determine to what extent the beneficial effect of headings is due to activation of relevant schemas, promotion of the interrelating of concepts in the text, and provision of retrieval cues (Brooks et al., 1983).

The overall effect of adjunct questions was not significant in this experiment in which lookbacks were encouraged and subjects were presumably highly motivated to perform well. This overall result is in accord with Duchastel and Nungester's (1984) failure to find a significant indirect effect of adjunct questions on multiple-choice performance when subjects were encouraged to review the text for answers to the questions. However, the significant interaction of questions and locus of control in the present experiment illustrates that the indirect effect of adjunct questions in a lookback situation may be related to learner characteristics such as locus of control. Thus, adjunct questions cannot simply be dismissed as ineffective in situations in which readers can search the text for answers to the questions. Rather, the results of the present experiment suggest that adjunct questions with lookbacks may induce a very general review of the relevant passage material by readers with an internal locus of control and that this review may facilitate retention of unquizzed as well as

quizzed information from that passage segment. Therefore, the interaction of questions and locus of control in this experiment illustrates the importance of examining the usefulness of text processsing aids in relation to learner characteristics. Such research represents a first step toward discovering how such aids differentially influence the reading behavior of individuals with different characteristics. In future studies, it will be desirable to attempt to assess more thoroughly, through the use of various types of retention test in addition to a multiple-choice test, the extent to which adjunct questions do indeed encourage in externals a very focused reprocessing of the passage information relevant to the question, while promoting in internals a more general and elaborative reprocessing of the material.

As expected on the basis of numerous previous studies that have examined the relationship between hierarchical importance of the passage information and probability of successful memory performance (e.g., Frederiksen, 1972, 1975; Kintsch, 1974; Meyer, 1975, 1977), main-idea retention test questions were answered better than detail retention test questions. However, the factor of type of retention test question did not interact with any of the other factors in the experiment, as might have been anticipated on the basis of previous studies by Wilhite (1982, 1985). In those

earlier studies, Wilhite found that postpassage adjunct questions facilitated high-level indirect recall but not low-level indirect recall, but in the present experiment the facilitative effect of the adjunct questions for internals was not limited to main-idea information. This lack of a significant interaction supports the suggestion that the adjunct questions with lookbacks induced in the subjects with an internal locus of control a general memory-facilitaing review process that included processing of both high-level and low-level information.

Some of the differences noted in the performance of subjects with an internal locus of control and those with an external locus of control are generally consistent with predictions made on the basis of Lefcourt's (1982, chap. 5) characterization of internals and externals. The finding that adjunct questions significantly facilitated indirect retention for internals but not for externals is consistent with Lefcourt's argument that externals tend to be less likely to try discriminate between potentially relevant and potentially irrelevant information in a learning situation. Apparently, internals used the presence of adjunct questions as a basis for differentially processing the various sections of the passage, whereas the externals showed no evidence of having studied more extensively the passage sections followed by a question. The prediction that internals would

outperform externals in answering multiple-choice questions about passage segments for they received adjunct questions was not confirmed. The difference was in the predicted direction, but it failed to reach conventional levels of statistical significance. However, externals did significantly outperform internals in answering multiple-choice questions about passage segments for which no adjunct questions were presented. Thus, internals may be even more discriminating in their attempts to assimilate new information than Lefcourt has suggested. That is, they may so attenuate processing of information perceived to be less relevant to the primary task as to lower their level of performance below that of externals. The fact that the factor of headings did not interact with locus of control suggests that the type of passive organizational processing encouraged by headings is not as likely to be mediated by the characteristics of the learner as is the more active type of processing strategy induced by adjunct questions.

References

Anderson, R. C., & Biddle, W. B. (1975). On asking people questions about what they are reading. In G. H. Bower (Ed.), The psychology of learning and motivation (Vol. 9, pp. 89-132). New York: Academic Press.

Andre, T. (1979). Does answering higher-level questions while reading facilitate productive learning? Review of Educational Research, 49, 280-318.

Brooks, L. W., Dansereau, D. F., Spurlin, J. E., & Holley, C. D. (1983). Effects of headings on text processing. Journal of Educational Psychology, 75, 292-302.

Burns, J. M., Peltason, J. W., & Cronin, T. E. (1980). Government by the people. Englewood Cliffs, NJ: Prentice-Hall.

Duchastel, P. C., & Nungester, R. J. (1984). Adjunct question effects with review. Contemporary Educational Psychology, 9, 97-103.

Frederiksen, C. H. (1972). Effects of task-induced cognitive operations on comprehension and memory processes. In J. B. Carroll & R. O. Freedle (Eds.), Language comprehension and the acquisition of knowledge (pp. 211-246). Washington, DC: Winston.

Frederiksen, C. H. (1975). Representing logical and semantic structure of knowledge acquired from discourse. Cognitive Psychology, 7, 371-458.

French, J. W., Ekstrom, R. B., & Price, S. A. (1963). Kit of reference tests for cognitive factors. Princeton, NJ: Educational Testing Service.

Hartley, J., & Trueman, M. (1983). The effects of headings in text on recall, search and retrieval. British Journal of Educational Psychology, 53, 205-214.

Holley, C. D., Dansereau, D. F., Evans, S. H., Collins, K. W., Brooks, L., & Larson, D. (1981). Utilizing intact and embedded headings as processing aids with nonnarrative text. Contemporary Educational Psychology, 6, 227-236.

Kintsch, W. (1974). The representation of meaning in memory. Hillsdale, NJ: Erlbaum.

Lefcourt, H. M. (1982). Locus of control: Current trends in theory and research. Hillsdale, NJ: Erlbaum.

Mandler, G. (1972). Organization and recognition. In E. Tulving & W. Donaldson (Eds.), Organization of memory (pp. 139-166). New York: Academic Press.

Mandler, G. (1977). Commentary on "Organization and memory." In G. H. Bower (Ed.), Human memory: Basic processes (pp. 297-308). New York: Academic Press.

Meyer, B. J. F. (1975). The organization of prose and its effect on recall. New York: North-Holland.

Meyer, B. J. F. (1977). The structure of prose: Effects on learning and memory and implications for educational practice. In R. C. Anderson, R. J. Spiro, & W. F.

Montague (Eds.), Schooling and the acquisition of knowledge (pp. 179-214). Hillsdale, NJ: Erlbaum.

Nist, S. L, & Hogrebe, M. C. (1984, April). The effects of headings and interspersed questions on the immediate and delayed recall of text. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Nowicki, S., & Duke, M. F. (1974). A locus of control scale for college as well as noncollege adults. Journal of Personality Assessment, 38, 136-137.

Rickards, J. P. (1979). Adjunct postquestions in text: A critical review of methods and processes. Review of Educational Research, 49, 181-196.

Rothkopf, E. Z. (1972). Structural text features and the control of processes in learning from written materials. In J. B. Carroll & R. O. Freedle (Eds.), Language comprehension and the acquisition of knowledge (pp. 315-335). Washington, DC: Winston.

Wilhite, S. C. (1982). Postpassage questions: Influence of question level. American Journal of Psychology, 95, 635-654.

Wilhite, S. C. (1983). Prepassage questions: The influence structural importance. Journal of Educational Psychology, 75, 234-244.

Wilhite, S. C. (1984). Hierarchical importance of pre-passage questions: Effects on cued recall. Journal of Reading Behavior, 16, 41-59.

Wilhite, S. C. (1985). Differential effects of high-level and low-level postpassage questions. American Journal of Psychology, 98, 41-58.

Author Note

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Footnotes

[1] The passage used in the experiment can be obtained from the author on request.

[2] The multiple-choice retention test used in the experiment can be obtained from the author on request.

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Table 1

Mean Number of Multiple-choice Retention Test Questions Answered Correctly

Headings group	Question condition		
	Present	Absent	Combined
Internal locus of control group			
Headings present			
Main-idea questions			
M	3.29	2.96	3.12
SD	.90	.76	
Detail questions			
M	2.23	1.62	1.93
SD	.82	1.23	
Headings absent			
Main-idea questions			
M	3.31	2.60	2.95
SD	.82	1.15	
Detail questions			
M	1.95	1.52	1.74
SD	1.07	1.01	
Combined	2.70	2.18	
External locus of control group			
Headings present			
Main-idea questions			
M	3.17	3.17	3.17
SD	.86	1.02	
Detail questions			
M	2.39	2.24	2.32
SD	1.15	.80	
Headings absent			
Main-idea questions			
M	2.64	3.25	2.94
SD	.97	.89	
Detail questions			
M	1.64	1.80	1.72
SD	1.08	1.29	
Combined	2.42	2.60	

Note. The means shown were adjusted for the effect of the covariate, vocabulary test score. The maximum possible score was 4.